Development of a Critical Care Triage Protocol for Pandemic Influenza: Integrating Ethics, Evidence and Effectiveness

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Health experts have warned that an influenza pandemic is inevitable; however, the recent outbreak of the H1N1 influenza strain shifted the public's perception of this risk from theoretical to real and urgent (Garrett et al. 2008; Toronto Academic Health Sciences Network 2006; Vawter et al. 2007). In response to the 2003 outbreak of severe acute respiratory syndrome (SARS), the Ministry of Health and Long-Term Care (MOHLTC) in Ontario accelerated efforts to develop a comprehensive and coordinated plan to respond to with an influenza pandemic. In 2005, MOHLTC asked healthcare organizations to develop a local pandemic plan aligned with the Ontario Health Plan for an Influenza Pandemic (OHPIP). Based on standard modelling (a 35% attack rate), the OHPIP estimates that at the peak of the pandemic, influenza patients will require 170% of available intensive care unit (ICU) beds and 117% of ventilators in Ontario (MOHLTC 2008). The current average occupancy rate in Ontario ICUs is 85% – thus in, a pandemic demand could easily exceed the usual ICU bed capacity. While governments are purchasing more ventilators (Galloway 2009, July 6), this is unlikely to solve the problem. Recent studies predict the attack rate for healthcare providers (HCPs) will be significantly higher than that in the general population (Gardam et al. 2007), perhaps nearing 50%. HCPs may also be prevented from working due to competing priorities, such as caring for sick family members and protecting themselves from infection.

This presents Ontario hospitals (and hospitals around the globe) with the following scenario: more than twice as many patients will require intensive care, with less than half the usual staff available to provide it.

The OHPIP outlines a stepwise strategy to deal with this situation:

1. Build ICU surge capacity
2. Adjust critical care provided to focus on key interventions
3. Initiate critical care triage based on the Sequential Organ Failure Assessment (SOFA) tool (Christian et al. 2006) (Figure 1), as outlined by MOHLTC (2008; Chapter 17)

Despite the OHPIP's detailed and thoughtful plan for critical care resource management, when the Hamilton Health Sciences (HHS) Pandemic Influenza Planning Committee contemplated how the triage process would be enacted at our hospitals, numerous gaps were identified:

- How is critical care triage operationalized in different care settings within the hospital (e.g., emergency department, hospital wards, ICU)?
- Who can function as a "triage officer"? What skills are required? If there is a single triage officer in each institution, what happens when these officers are needed in two places at once?

Figure 1. Prioritization-of-patients tool for potential admission to ICU

Critical Care Triage Tool (Initial Assessment)		
Colour Code	**Criteria**	**Priority/Action**
Blue	**Exclusion Criteria*** *or* **SOFA > 11***	**Medical Mgmt +/- Palliate & d/c from CC**
Red	**SOFA ≤ 7** *or* **Single Organ Failure**	**Highest**
Yellow	**SOFA 8 – 11**	**Intermediate**
Green	**No significant organ failure**	**Defer or d/c, reassess as needed**

* If exclusion criteria or SOFA > 11 occurs at anytime from initial assessment to 48 hours change triage code to Blue and palliate.

CC = critical care; d/c = discharge; ICU = intensive care unit; SOFA = Sequential Organ-Failure Assessment.

BLUE: Patients should *not* receive critical care. Depending on their condition and medical issues, the patients may continue to have curative medical care or palliative care.

RED: Patients are *highest* priority for ICU admission and a ventilator, if required. Patients with a single organ failure, particularly those with respiratory failure due to influenza, and who otherwise have a very low SOFA score, are included in the red category (if they have no exclusion criteria).

YELLOW: Patients are very sick and may or may not benefit from critical care. They should receive care if resources are available but not at the expense of denying care to someone in the red category who is more likely to recover. At reassessment points, improving patients are given highest priority (red) for continued care, while those who are not showing signs of improvement or are worsening are prioritized as yellow.

GREEN: Patients are well enough to be considered for transfer out of/diversion from the ICU.

Source: *Ontario Health Plan for an Influenza Pandemic.* Reproduced with permission from the Ministry of Health and Long-Term Care (2008: 17A-3). © Queen's Printer for Ontario, 2008.

- Should these life and death decisions, made under extremely stressful circumstances, rest on the shoulders of single individuals? What are the risks of this model for triage officers and healthcare organizations? What supports do triage officers require?
- What procedural and institutional structures ensure triage decisions are of high quality, consistent (across time, triage officers and different hospitals), efficient, ethical and evidence-based? How should decisions be documented?
- What happens if the demand for critical care is so great that it cannot be managed using the OHPIP process? How should choices be made between patients with the *same* clinical priority for critical care (i.e., SOFA score)?

Scholars and physicians have been calling for practical and rigorous pandemic triage pandemic processes that integrate the best clinical evidence with sound ethical principles to support these morally complex decisions (Galloway 2009, July 27). While OHPIP's adoption of the SOFA scale and an

ethical framework is a crucial advancement in critical care triage, no public agency to date has created guidelines that are sufficiently rigorous and readily applicable to a real-world hospital setting. To our knowledge, HHS is the first hospital in Canada to develop a detailed critical care triage protocol for bedside application. The full version of this protocol and its appendices (including tools and worksheets) – titled *Adult Critical Care Triage and Resource Allocation Protocol for Pandemic Influenza* – can be viewed at http://www.longwoods.com/articles/images/PandemicProtocol.pdf. In this article, we present (1) the rationale and process HHS undertook to create this protocol, (2) highlights and key innovations of the protocol and (3) issues arising from preliminary testing of the protocol.

Background

HHS is a family of six hospitals and a cancer centre in Hamilton, Ontario, serving more than 2.3 million residents of Central Southwest Ontario. HHS is affiliated with McMaster University's Faculty of Health Sciences; each hospital has specific areas of expertise, creating one of the most comprehensive healthcare systems in Canada. Our facilities offer a range of acute and specialized services, including about 3,100 births, 108,700 emergency visits and 41,000 in-patient admissions a year. HHS currently has adult ICUs in three of its hospitals, composed of 63 ventilated ICU beds with an occupancy rate of 87–103%.

In spring of 2005, HHS began developing its comprehensive pandemic influenza plan. HHS's ethicist (A.F.) attended planning meetings with teams around the hospital to identify and address the ethical issues arising from this planning process. Teams repeatedly departed from their agenda (surveillance, infection control, staffing plans etc.) to talk about the decisions they imagined they would face in a pandemic: *Will it be safe for me to come to work? What if I infect my family? Will I get treated if I get sick on the job? Who will make decisions about who lives and who dies when resources are stretched? How will these decisions be made? Will the hospital stand behind those decision-makers?* The sense of anxiety in the room was often palpable just contemplating this scenario.

Such anxiety is understandable when one considers that the form of triage required in a pandemic (unlike traditional triage in the emergency department, which assumes all patients will receive treatment … eventually) runs counter to professional

codes of ethics and usual practices. Pandemic triage shifts the focus of healthcare from the well-being of individuals to the good of the public and the integrity of the social fabric – a shift that cannot come easily or quickly to professionals schooled in the foundational principle of respecting patient autonomy (Kraus et al. 2007).

During these meetings, clinicians sometimes speculated about how they would make decisions. For example, some would allocate care to younger people, while others would bypass prisoners if "productive members of society" needed treatment. Their reasons varied widely and appeared to be based on their professional experiences and personal moral intuitions. The OHPIP includes an ethical framework with substantive and procedural values (see Appendix A of the protocol); however, these values remain too general to provide specific direction for their application in a real-world pandemic.

The need for clear triage processes became even greater following Hurricane Katrina, when three HCPs who had provided palliative care to patients in a New Orleans hospital were charged with committing murder – charges that were later dropped (Okie 2008, Fink 2009). Without a clear protocol to allocate scarce life-saving treatments in a pandemic, HCPs could be vulnerable to similar legal actions after the fact, and patients could be vulnerable to the idiosyncratic beliefs, judgments and morals of individual triage officers making life and death decisions.

When the latest OHPIP Acute Care Services Plan was released in August 2008, many questions remained regarding how it could be implemented rapidly, consistently and ethically across a multi-site tertiary care centre such as HHS. After conducting a gap analysis, the HHS ethicist contacted the MOHLTC Emergency Management Unit. Members of this unit indicated that there are no immediate plans to refine or expand the OHPIP, but they encouraged HHS to use the OHPIP as the basis for developing a more detailed hospital policy (MOHLTC 2008, October). That fall, the HHS ethicist received a mandate from the HHS Leadership Team to develop an adult critical care triage and resource allocation protocol, under the auspices of the Pandemic Influenza Planning Committee. While HHS leaders recognized that it is unorthodox (and potentially controversial) for a hospital to independently create a protocol of such ethical complexity and public consequence, they felt it was *unethical* to recognize the need for more detailed guidelines and do nothing but wait and hope that another agency would fill the gaps.

Goals of Triage Protocol and Key Success Factors

The purpose and goals of the HHS protocol are stated in section 2.0. During a prolonged pandemic when resources are overwhelmed, the protocol aims to support decision-makers by detailing a procedure for making triage decisions that protects

the community by maximizing benefits and minimizing harms. The protocol was developed over a 10-month period from September 2008 to June 2009, following the steps outlined in Table 1.

Table 1. Steps in protocol development

Review the bioethics and emergency preparedness literature, focusing on critical care triage processes and resource allocation prioritization criteria.

Develop a list of supplementary resource allocation criteria gleaned from the literature. Design the basic structure of the Triage Team. Consult with the HHS human rights specialist to ensure neither contains prohibited grounds from the Ontario Human Rights Code.

Solicit feedback from key internal stakeholders: the Pandemic Influenza Planning Committee; surgery, internal medicine, critical care, infectious diseases and emergency medicine; chiefs of professional practice; the clinical executive; and the board of directors. Also seek feedback from a key external stakeholder, the Regional Bioethics Group (a community of practice for bioethicists working in hospitals across South Central Ontario).

Clinical Ethics, Professional Advisory and Medical Advisory Committees review and approve the protocol.

Develop an e-learning module to provide access to education about the protocol to all staff 24/7.

Conduct a tabletop exercise to test the protocol, specifically the functionality of the clinical and supplementary criteria, and the Triage Team based on an overwhelming surge scenario.

HHS = Hamilton Health Sciences.

The key success factors for the protocol were defined as follows:

- Align with the ethical framework and existing surge management and triage processes contained in the OHPIP (MOHLTC 2008)
- Anticipate the worst-case scenario wherein the OHPIP is insufficient to guide decision-making
- Explicitly support the Ontario Human Rights Code so that decisions are not based on prohibited grounds (see section 4.3 of the protocol)
- Incorporate current thinking from bioethics and pandemic planning literature
- Support consistent decision-making across triage officers, units and hospitals
- Ensure the integrity and quality of resource-allocation decisions, addressing such elements as managing conflicts of interest, quality review, transparency and documentation
- Provide moral and institutional support to decision-makers so that no single individual bears burdens alone

- Receive endorsement by key internal stakeholders, in consultation with select external stakeholders
- Above all, be feasible and flexible to apply to a context when human resources and time are scarce

Literature Review

The literature revealed that many pandemic plans have given little attention to the implementation of ethical values (Kotalik 2005). Those that do consider ethics reference them in general terms only; for instance, Christian et al. (2006) note that substantive and procedural values informed their protocol, but they do not elaborate on how this was done (Melnychuk and Kenny 2006). The literature is full of platitudes about making principled, transparent and accountable decisions (University of Toronto Joint Centre for Bioethics Pandemic Influenza Working Group 2005) but provides little instruction about how to do so in real time (Tuohey 2007).

In the pandemic planning literature, a divide emerges between the ideal of a deliberative process and the pragmatic pressures on decision-makers to act quickly in stressful and chaotic situations. Staff burnout is not anticipated (Kipnis 2003); rather, workers are treated as consummate professionals or even automatons, without their own feelings, biases and value systems. The title "triage officer" affords the role some measure of mystique; like police officers and military officers, they are endowed with a form of disciplinary authority that empowers them to judge right and wrong. For example, in the protocol created by Devereaux et al. (2008), it is the responsibility of a lone triage officer to decide who will or will not receive treatment. Some essential qualifications for this role are listed (e.g., leadership ability and clinical expertise), but the consideration of human factors (e.g., support systems or guidelines) is not discussed. Even when authors advocate for a committee approach to triage, important procedural elements such as membership, quality control and group decision-making processes are neglected (Christian et al. 2006; Hick et al. 2007).

Our literature review unearthed suggestions for making decisions when treatment cannot be provided to all critically ill patients. Some advocated for a "first-come, first-served" model (Devereaux et al. 2008); some proposed that a lottery system is the only fair way to ensure all patients have equal access to life-saving care (Tabery and Mackett 2008). Others suggested using certain non-clinical criteria, which we term "supplementary criteria." The supplementary criteria most commonly mentioned were the multiplier effect, workplace exposure, caregivers and the "fair-innings" or "life-cycle principle."

The *multiplier effect* supports the utilitarian goal of triage by prioritizing treatment for those with the skills and knowledge to save others, thus multiplying the net benefit to society (Sztajnkrycer et al. 2006). (This assumes the multiplier is likely to recover sufficiently to care for others). During an influenza

pandemic, multipliers would include HCPs, vaccine developers, public health workers and workers in essential services (e.g., firefighters, police officers and ambulance attendants). For example, Gardam et al. (2007) argue that morbidity in the general public in a pandemic could be reduced by 45% if HCPs were kept healthy and encouraged to come to work through the provision of prophylaxis. This criterion supports the OHPIP's values of equity, reciprocity and stewardship by supporting those who face a disproportionate burden during a pandemic and protecting life-saving resources.

The criterion of *HCP/essential services workplace exposure* gives priority to workers who likely contracted influenza through their professional duties, for example, by working in a high-risk environment such as a "flu ward." Although influenza is a community-acquired infection, HCPs are expected to suffer a significantly higher attack rate than the general public. If the priority during a pandemic is public health, then it is necessary to protect those who protect the public's health (Gostin 2006). This criterion is aligned with the OHPIP's values of equity and reciprocity; prioritizing those who place themselves at risk to save others somewhat equalizes the risks they face. This may also have a positive effect by acting as an incentive for workers to report for duty, knowing that if they get seriously ill, they will be given priority access to critical care.

Prioritizing *caregivers* also extends utilitarian principles by aiming to minimize the harm done to families and society. After the 1918 pandemic, 21,000 children were left orphaned in New York City alone (Vawter et al. 2007). By prioritizing people with dependents at home (including pregnant women, parents of young children and primary caregivers for disabled adults and elders), this criterion reduces the burden on state resources and prevents the long-term physical and psychological harm dependents suffer due to the loss of a caregiver. This exemplifies the OHPIP's values of stewardship and protection of the public from harm, allocating resources in a way that minimizes societal disruption.

The *fair-innings/life-cycle principle* holds that all people should have the opportunity to live through all stages of life; therefore, the deaths of young people are especially tragic (Emanuel and Wertheimer 2006; Sztajnkrycer et al. 2006). This criterion prioritizes those at an earlier stage in the life cycle *relative* to others. This is not based on absolute age (e.g., favouring a 23-year-old over a 27-year-old) but, rather, on a patient's stage in life: a 20-year-old may be prioritized over a 60-year-old who has had 40 more years of life experience. This supports the value of equity by affording younger persons the same life opportunities as older persons; it also supports stewardship, as investing resources in the younger person will likely result in a greater net gain of life years saved.

The supplementary criterion of *prognosis* considers factors that suggest better or worse outcomes based on clinical judgment

and experience (Hick and O'Laughlin 2006; Devereaux et al. 2008; Powell et al. 2008). Arguably, prognosis should be the overriding element in critical care triage; however, in the early stages of a pandemic, it is unlikely that there will be sufficient evidence to support clear differentiation between patients with equal SOFA scores. Determining accurate prognoses will be hampered by the fact that triage officers will likely be unable to complete a full examination and history for each patient, making prognoses more subjective. Moreover, if prognosis trumps all other considerations, this may lead to "invisible rationing," where insidious reasons for decisions are hidden beneath the cloak of "clinical judgment" (DeCoster 2006: 621). Nevertheless, if there is clear evidence for a substantial difference in outcomes between two otherwise-equal patients (i.e., one patient has a >25% better chance of survival), this should be taken into consideration. *Heroism* is another criterion that surfaced in the literature review (University of Toronto Joint Centre for Bioethics Pandemic Influenza Working Group 2005). Based on the value of reciprocity, those who demonstrate selflessness by caring for others at the expense of their own safety during a pandemic are given priority.

Population-based mortality risk is a criterion that values the preservation of every generation or identified cohort in society. Mortality rates for the 1918 pandemic were unusually high for young, healthy adults ages 15–40 (Garrett et al. 2008). In a future pandemic, if evidence emerges that a particular demographic segment is more vulnerable to influenza, this criterion would prioritize this group based on the value of equity (equalizing the risk to all segments of society). For example, in the case of the H1N1 strain, Aboriginal people have been particularly hard hit (CBC News 2009, July 20); this criterion would give priority to members of this group to safeguard the integrity and continuity of this community.

Key Elements of the Protocol
The majority of the protocol is derived directly from the OHPIP (see steps one through three in Figure 2), with four key refinements and innovations: (1) specific triage processes for various hospital locations (emergency department, ICU, wards), (2) definitions of acceptable supplementary criteria and clear guidelines for their use, (3) the creation of a Triage Team model with quality assurance processes and (4) worksheets and tools to support consistent practice.

Location-Specific Triage Processes
Early in the development process, stakeholders across the hospital identified that the OHPIP triage process was not a one-size-fits-all solution. Emergency department physicians asked for a tool to enable them to rapidly assess whether patients presenting in acute respiratory distress meet exclusion criteria before attempting to SOFA score them (see Appendix B and section 4.2 of the
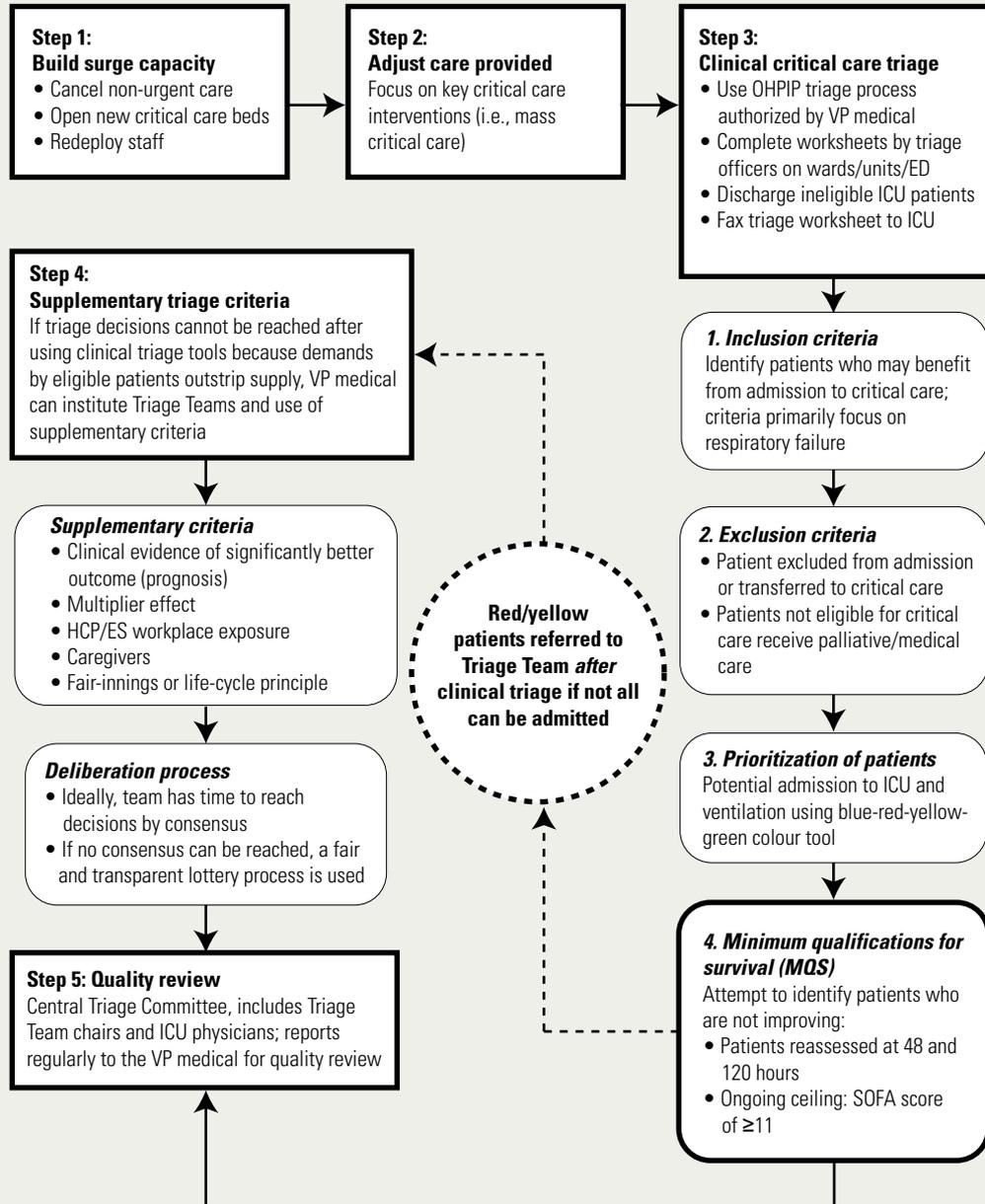
protocol). They also needed to clarify how to treat eligible patients requiring urgent ventilation if there is no space in the ICU. Considering expected human resource constraints, a decision was made to treat these patients palliatively rather than attempt to intubate and ventilate manually in the emergency department while waiting for a bed that may never materialize (section 4.2). Triage on the ward follows the OHPIP steps, supported by the Critical Care Triage Worksheet: Initial Assessment (Appendix B of the protocol). Final admission decisions are made not by local triage officers but by senior ICU physicians (if all patients requiring intensive care can be accommodated) or the Triage Team (if the surge is so large that some priority patients must be turned away). The ICU triage process (section 4.4) recognizes that some patients will have to be discharged rapidly if they no longer qualify for treatment, requiring a discharge destination and (often) palliative care (Figure 2).

Supplementary Criteria
The SOFA scale is not sensitive enough to distinguish between patients who have the same status (e.g., red), nor has it been validated for use in a pandemic. At the outset of the development of the protocol, key stakeholders indicated that either a lottery or "first-come, first-served" system would not be acceptable means to prioritize patients with the same SOFA status. Both systems were thought to be vulnerable to manipulation, and stakeholders recoiled from the idea of leaving these decisions up to chance, preferring to employ judgment and moral reasoning (however imperfect). Therefore, supplementary criteria were defined to inform decisions of the Triage Team. Feedback was sought on all the supplementary criteria gleaned from the literature. Eventually five were selected: the multiplier effect, HCP/essential services workplace exposure, caregivers, prognosis and the fair-innings/life-cycle principle. These criteria are not rank ordered but should be weighed and deliberated as independent variables in the prioritization process. The protocol repeatedly states that clinical triage must always be completed first (if possible) and that supplementary criteria can only be considered by the Triage Team to avoid bedside rationing based on "social criteria." These criteria were selected for four reasons.

First, they are based on knowable facts (age, dependents, occupation etc.) that can be quickly gathered from a brief interview with the patient/family or from the health record. This is preferable to subjective assessments such as "quality of life" or "contribution to society." Second, these criteria reflect widely held values (such as those in the OHPIP) and moral intuitions. Third, they support and extend the utilitarian premise of triage, considering benefits/harms beyond the absolute number of lives saved, with a goal of maximizing benefits to society and minimizing harms. Fourth, each of these criteria can be answered with "yes," "no" or "uncertain" for clarity and efficiency. In addition, the HHS human rights specialist determined that

Figure 2. Triage process overview

Step 1:
Build surge capacity
• Cancel non-urgent care
• Open new critical care beds
• Redeploy staff

Step 2:
Adjust care provided
Focus on key critical care interventions (i.e., mass critical care)

Step 3:
Clinical critical care triage
• Use OHPIP triage process authorized by VP medical
• Complete worksheets by triage officers on wards/units/ED
• Discharge ineligible ICU patients
• Fax triage worksheet to ICU

Step 4:
Supplementary triage criteria
If triage decisions cannot be reached after using clinical triage tools because demands by eligible patients outstrip supply, VP medical can institute Triage Teams and use of supplementary criteria

Supplementary criteria
• Clinical evidence of significantly better outcome (prognosis)
• Multiplier effect
• HCP/ES workplace exposure
• Caregivers
• Fair-innings or life-cycle principle

Deliberation process
• Ideally, team has time to reach decisions by consensus
• If no consensus can be reached, a fair and transparent lottery process is used

Step 5: Quality review
Central Triage Committee, includes Triage Team chairs and ICU physicians; reports regularly to the VP medical for quality review

Red/yellow patients referred to Triage Team *after* clinical triage if not all can be admitted

1. Inclusion criteria
Identify patients who may benefit from admission to critical care; criteria primarily focus on respiratory failure

2. Exclusion criteria
• Patient excluded from admission or transferred to critical care
• Patients not eligible for critical care receive palliative/medical care

3. Prioritization of patients
Potential admission to ICU and ventilation using blue-red-yellow-green colour tool

4. Minimum qualifications for survival (MQS)
Attempt to identify patients who are not improving:
• Patients reassessed at 48 and 120 hours
• Ongoing ceiling: SOFA score of ≥11

ED = emergency department; ES = essential services; HCP = healthcare professional; ICU = intensive care unit; OHPIP = Ontario Health Plan for an Influenza Pandemic; VP = vice-president.

evaluate and prioritize all current candidates.

Heroism was dropped from the supplementary criteria because it was perceived to be too subjective, while *population-based mortality risk* was eliminated because it contradicts the utilitarian goal of triage (i.e., use your resources to save the most lives) and because we may not have sufficient epidemiological data until after the pandemic.

Triage Team and Quality Assurance
The OHPIP acknowledges that "triage is challenging both clinically and psychologically" (MOHLTC 2008: 17-12); yet, despite this recognition, no specific support or direction is provided to triage officers. The officer appears to shoulder the burden alone in deciding who will live and who will die. The protocol attempts to define the role and quali-

they do not involve any prohibited grounds contained in the Ontario Human Rights Code. Two criteria (prognosis and life-cycle principle) are not independent criteria but can only be determined relative to other patients with the same clinical status; these can only be determined by the Triage Team as they

fications more robustly (see protocol sections 5.1–5.3 and Appendix G). Two processes were put in place to protect those functioning as triage officers. First, worksheets were devised to ensure a consistent application of the triage process and to assist with documentation. Second, final decisions for allocating

critical care resources were removed from the triage officers working on the front lines and assigned to a senior ICU physician or Triage Team. This will hopefully shield officers from retaliation by upset family members as officers will be able to say, "I followed the appropriate process, but ultimately it wasn't my decision to deny your loved one treatment."

The Triage Team model removes the burden from a single individual and creates a community of support for those charged with making these tragic choices. The team is composed of a senior ICU physician, a non-physician critical care HCP and a professional from outside the ICU. The model was designed with several goals in mind: incorporate clinical expertise with ethical deliberation through an inter-professional composition; be small enough to be efficient and make consensus plausible but large enough to dilute individual biases; manage conflicts of interest and enhance objectivity by relieving team members from direct care of patients; and compel decision-makers to articulate the reasons for their decisions to mitigate the risk of invisible rationing. Only when there are more patients with eligible SOFA scores than available resources can the Triage Team resort to the supplementary criteria to make decisions; if consensus cannot be reached within a reasonable amount of time, a transparent and unbiased process of random selection (i.e., a lottery) can take place. Particular care was taken to describe the role of the Triage Team chair (e.g., facilitation and documentation of decisions). A formal appeals process for Triage Team decisions was not included as this would not be feasible in a truly overwhelming surge. However, the Central Triage Committee provides a forum for oversight and quality improvement, anticipating that triage processes will need to be adapted to changing realities.

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Worksheets and Tools

Worksheets were developed for all aspects of the critical care triage process (see Appendices B, C, D and E in the protocol). These tools incorporate key elements of the OHPIP triage process as well as features unique to the HHS protocol. They contain no names in order to maintain patient anonymity (and to avoid favouritism and conflicts of interest). Anticipating that many patients might need to be triaged in a short period of time, an additional worksheet (Appendix H) was created to collate the information provided by triage officers to facilitate comparison. Ideally, each patient's case is examined by the Triage

Team, weighing all variables and criteria together. However, if time is short, these worksheets enable the Triage Team to quickly prioritize patients based on their SOFA scores and evidence for supplementary criteria.

Discussion

The process of developing this protocol offered fascinating insights into individual and organizational capacities to rationally grapple with the prospect of a worst-case scenario pandemic. One challenge encountered in stakeholder feedback sessions was a phenomenon we came to call "the 10-minute checkout." About 10 minutes into the presentation, once the audience absorbed the projected attack, surge and mortality rates for a lethal pandemic, many people appeared to stop listening. It was later revealed they were "checking out" because they were preoccupied by the personal questions raised by this spectre: *Would I choose to work in a flu ward? Would I get sick? What would my family do if I died?* We learned that in order to engage in effective planning, staff must be given time and opportunity to articulate their fears and reflect on how they would cope with the challenges they would face in a pandemic.

During stakeholder feedback sessions, it proved challenging to get every group to rigorously engage with both the clinical and ethical components of the protocol. Clinicians fixated on clinical and logistic issues, while non-clinical stakeholders (i.e., board members and Ethics Committee members) focused on the supplementary criteria and decision-making processes. This speaks to the need for engaging both clinical and ethical perspectives to create a balanced triage process.

Many stakeholders initially expressed alarm at the prospect of prioritizing patients based on who is "more deserving." However, once they understood that the supplementary criteria do not judge some persons as inherently more valuable but, rather, extend the utilitarian basis of triage (Tabery and Mackett 2008), they endorsed these criteria as sound and reasonable. Nevertheless, we did not engage in a community stakeholder feedback process to determine how acceptable these criteria would be to the people of Hamilton at large. It is possible, for example, that some ethnic groups might prioritize elders over youngsters because the cultural and familial wisdom they possess is so valuable to their communities. In such groups, the life-cycle principle might not be acceptable. This demonstrates a fundamental problem with utilitarianism in general in that what constitutes "utility" is debatable. A concern was also raised that the multiplier and HCP/essential services workplace exposure criteria might be perceived as a conflict of interest for the hospital, ostensibly giving priority access to our own staff. This criticism was largely allayed once stakeholders understood that the public at large would benefit (through reduced morbidity and mortality) if these workers were to come to work, and be treated if ill.

The tabletop exercise to test the protocol resulted in improvements to the usability of the worksheets. It also demonstrated the importance of having clear criteria and processes in order to avoid invisible rationing – for example, ad hoc priority systems based on age or other factors. Participants preferred to make decisions based on clinical judgment regarding patients' prognoses, appealing to supplementary criteria only as a last resort. This was encouraging as this is the intended use of these supplementary criteria. In the exercise, the Triage Team initially prioritized patients based on raw SOFA scores (i.e., a RED patient with a score of four was prioritized over one with a score of seven). However, as they examined the SOFA scores more closely, it became clear that each clinical indicator was open to some interpretation, for example: Does the patient have a low Glasgow Coma Scale score because he or she is sedated? What if renal function is compromised, but the etiology is reversible and the patient could have a good outcome? A consensus emerged that certain SOFA score elements were better predictors of mortality and therefore should carry more weight – specifically, a high Glasgow Coma Scale score (in non-sedated patients), a high creatinine level (dialysis may not be available during "adjusted critical care") and a high bilirubin level (suggestive of liver failure and, hence, multiple organ failure in an influenza patient).

Participants were frustrated relying on SOFA scores alone, citing that good clinical judgment relies on intuitions developed over years of cumulative experience, which can only be tapped into by seeing patients in person. This demonstrates how pandemic critical care triage reverses intensivists' usual practice, compelling them to make decisions based on aggregated data and standardized tools rather than tailoring treatment plans based on the unique clinical features, wishes and values of individual patients. It will likely be impossible for Triage Teams to examine each priority patient in person. Relying upon this process of triage at a distance demands significant trust: trust that laboratory values will be available quickly; trust that triage officers will have the skills to complete the SOFA score and worksheet accurately; trust that the SOFA scale is a valid and reliable predictor of mortality; trust that patients and families will tell the truth about their ages, occupations and caregiving responsibilities; and trust that the team members' colleagues, the hospital and their professional colleges are going to support them as they do the "impossible" in the best way they can.

Conclusions and Next Steps
Shifting from the ethics of individual patient rights to the ethics of public health and disaster medicine during a lethal pandemic will be difficult for HCPs (Kipnis 2003). Ultimately, critical care triage is about making tragic choices: all patients deserve life-saving treatments, but not all can receive them. This protocol addresses specific gaps in the pandemic literature – namely, the human dimensions of triage and the need for specific, feasible and rigorous guidelines for allocating scarce resources. Each element of the HHS triage protocol was created through consideration of the best available evidence, standards and stakeholder feedback, with the goal of maintaining alignment with the provincial plan while creating a more comprehensive and supportive process.

Nevertheless, the tabletop exercise revealed that even the most comprehensive protocol requires practice and support to enact. Several questions remain unanswered:

- This protocol (and the OHPIP triage process) applies only to adult patients as the SOFA score has been validated only on adults; how will pediatric critical care resources be allocated in a surge?
- How might the community be educated regarding pandemic triage processes, and constructive feedback solicited?
- Pandemic triage can only work if the Ontario Health Care Consent Act is temporarily suspended or altered to allow HCPs to withdraw and withhold critical care without requiring patient or family consent – how can this be done while still respecting fundamental patient rights?
- What additional support must be provided to help the Triage Team and ICU staff cope and remain effective (i.e., critical incident debriefing, pastoral care, security personnel etc.)?
- What palliative care is required for patients when critical care is withheld or withdrawn, to ensure they are comfortable?
- What happens if family members are prepared to manually ventilate ("bag") a patient in the emergency department when an ICU bed is not available?
- What infrastructure is needed to support the Triage Team's trust in the data they receive (including electronic medical records, electronic submission of triage worksheets, point-of-care testing for the rapid calculation of laboratory values etc.) when it is not possible for them to personally examine all eligible patients?
- What supports and incentives are required to encourage HCPs to work in high-risk hospital areas?

The process of developing this protocol highlighted the challenges hospitals face in enacting ethically and clinically rigorous critical care triage, including structural, procedural, organizational and human factors. At HHS, we plan to continue the educational rollout of the protocol to all staff in the ICU and emergency department and persons likely to function as Triage Team chairs. We also plan to share our experiences with provincial and federal agencies, with a goal of working toward developing a common language, standards and guidelines for critical care triage across systems. Ultimately, our hope is that enhanced surveillance, infection control and critical care capacity will obviate any need for this protocol. However,

should a lethal pandemic take hold in Ontario, we hope this protocol will mitigate the harm to our community and to our colleagues who will carry the burden of these tragic choices, and that history will not judge us harshly for our attempt to map the morally treacherous terrain of utilitarianism. HQ

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